

What is claimed is:

1. A method of coating a substrate, comprising the steps of:

5 a.) applying a first waterborne coating material over the substrate by one or more bell applicators, said first coating material being substantially free of effect pigment; and

10 b.) applying a second waterborne coating material over said first coating material by one or more bell applicators, said second coating material comprising effect pigment.

2. The method of claim 1, wherein said first coating 15 material is formed by dynamically mixing a plurality of primary colored waterborne coating components to form a first coating material of a selected color.

3. The method claim 1, wherein said first coating 20 material is formed by dynamically mixing a plurality of waterborne coating components and a first waterborne base component to form the first coating material of a selected color.

25 4. The method of claim 1, wherein said first coating material comprises a crosslinkable film forming material and a crosslinking material.

5. The method of claim 1, wherein said first coating 30 material comprises less than about 3 weight percent of effect pigment on a basis of total weight of said first coating material.

6. The method of claim 1, wherein said second coating 35 material comprises about 0.5 to about 40 weight percent of

effect pigment on a basis of total weight of said second coating material.

7. The method of claim 1, wherein said second coating material is formed by dynamically mixing at least one waterborne effect pigment-containing component and a second waterborne base component.

8. The method of claim 1, further comprising a step of subjecting the substrate to a flash environment between application of said first coating material in step (a) and said second coating material in step (b).

9. The method of claim 8, wherein said flash environment comprises a flash chamber having a temperature of about 50°F (10.0°C) to about 90°F (32.5°C), a relative humidity of about 40% to about 80% and an air velocity at the surface of the first coating material of about 20 FPM (0.10 m/s) to about 150 FPM (0.76 m/s).

10. The method of claim 9, wherein said flash chamber has a temperature of about 70°F (21.1°C) to about 75°F (24.0°C), a relative humidity of about 65% and an air velocity of about 50 FPM (0.25 m/s) to about 80 FPM (0.41 m/s).

11. The method of claim 8, wherein said substrate is subjected to the flash environment for a period of about 20 to about 180 seconds.

12. The method of claim 11, wherein said period is about 20 to about 60 seconds.

13. A method of coating a substrate, comprising the steps of:

a.) applying a first liquid basecoat material over a surface of the substrate by at least one bell applicator, said first basecoat material being substantially free of effect pigment;

5 b.) exposing said first liquid basecoat material to air having a temperature ranging from about 50°F (10°C) to about 90°F (32.5°C), a relative humidity of about 40% to about 80% and an air velocity at the surface of said first basecoat material of about 20 FPM (0.10 m/s) to about 150 FPM (0.76
10 m/s) for a period of about 10 to about 180 seconds; and

c.) applying a second liquid basecoat material over said set first liquid basecoat material by at least one bell applicator, said second basecoat material comprising effect pigment.

14. The method of claim 13, wherein said substrate comprises a material selected from the group consisting of iron, steel, aluminum, zinc, manganese, alloys, plastics and
15 combinations thereof.

15. The method of claim 13, wherein said metal substrate is an automotive body, motorcycle, bicycle or appliance component.

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16. The method of claim 13, wherein each of said liquid basecoat materials comprise water.

17. The method of claim 13, further comprising the step
25 of applying a clearcoat material over said second basecoat material.

18. The method of claim 17, further comprising the step of curing said basecoat and clearcoat materials after
30 application of said liquid clearcoat material.

19. The method as claimed in claim 13, further comprising:

a.) applying a first clearcoat material over said second basecoat material;

5 b.) exposing said first clearcoat material to air having a temperature ranging from about 50°F (10°C) to about -90°F (32.5°C) , a relative humidity of about 40% to about 80% and an air velocity at the surface of said first clearcoat material of about 20 FPM (0.10 m/s) to about 150 FPM (0.76
10 m/s) for a period of about 10 to about 180 seconds; and

c.) applying a second liquid clearcoat material over said set first liquid clearcoat material.

20. A composite basecoat for an automotive substrate,
15 said composite basecoat comprising:

a first basecoat layer applied by at least one bell applicator over a surface of said substrate, said first basecoat layer being substantially free of effect pigment; and

a second basecoat layer applied by at least one bell
20 applicator over said first basecoat layer to form said composite basecoat, said second basecoat layer comprising effect pigment.

21. The basecoat of claim 20, wherein said second
25 basecoat layer comprises about 40% of a total thickness of said composite basecoat.

22. A method of controlling a multi-bell applicator coating system, comprising controlling bell cup rotational
30 speed, shaping air volume and coating delivery rate to each bell applicator in the system such that each bell applicator produces a coating droplet size having a dominant droplet size peak at about 40% to about 70% concentration of about 15 to about 40 microns.

23. A method of controlling a multi-bell applicator coating system, comprising the steps of:

a.) determining bell rotational speed, shaping air supply and coating flow rate values for a bell applicator to
5 produce a desired droplet uniformity;

b.) using the values from step (a) to determine a control ratio of (rotation speed multiplied by shaping air supply) over the coating flow rate; and

c.) controlling the rotational speed, shaping air
10 supply and coating delivery rate of each bell applicator of the system to substantially maintain the control ratio.

24. The method of claim 23, wherein the values determined in step (a) are those which produce coating
15 droplets having a dominant droplet size peak at about 40% to about 70% concentration of about 15 to about 40 microns from the bell applicator.

25. A coating application system, comprising:
20 a first supply of one or more first coating components which are substantially free of effect pigment;
a second supply of one or more second coating components comprising effect pigment;
at least one mixer for receiving and dynamically
25 mixing at least one of the first coating components received from the first supply or at least one of the second coating components received from the second supply to form a mixed coating material; and
a bell applicator for receiving the mixed coating
30 material from the mixer and applying the mixed coating material over a surface of a substrate.

26. The system of claim 25, wherein said first supply comprises a plurality of primary-colored waterborne coating
35 components.

27. The system of claim 25, wherein the second supply comprises a plurality of effect-pigment containing components.

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